Is the Heptagram in CBS1766 a Dial?

By: Richard J dumbrill

The heptagram on the tablet is inscribed within two concentric circles. The seven points of the heptagram are labelled with the names of musical strings and with numbers. This paper will argue that this was the representation of a dial showing the construction of the heptatonic scale and the location of the seven modes originating from each of its degrees.

CBS 1766

Music Theory

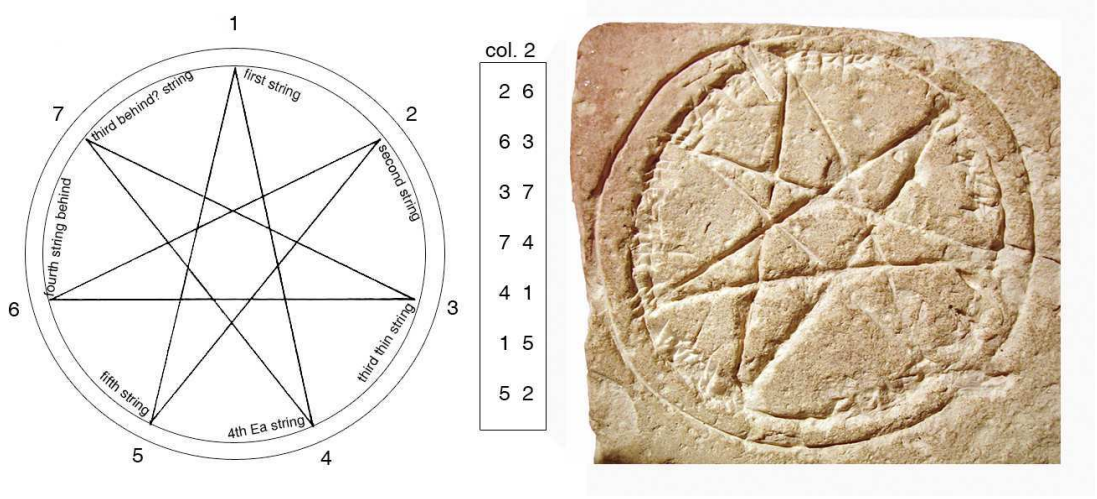
Firstly, we must prove that the tablet is about music theory. The evidence in favour is that the terms labelling each of the points of the heptagram are the first seven musical strings, out of nine, listed in UET.VI,126. There is no reason to assume that the names referred to anything else than the strings of an undefined musical instrument. The merit for this elucidation is owed to Caroline Waerzeggers and Ronny Siebes[1] who gave an alternative reading, correcting Horowitz's[2] who thought that the text might be astrological.

[1] N.A.B.U. 2007, n.2, juin
[2] JANES 30

Horowitz's reading		emendation by CW and RS	meaning
1	*da-mu*	*qú-ud-mu*	first string of the front
2	*u₄-mu-sum*	*sa-mu-šum*	second string of the front
3	[broken]		[third thin string]
4	*kal/lab-ba-nu*	*é/e-a-ba-nu*	fourth small string made by Ea
5	*ḫa-an-su*	same reading	fifth string
6	RI-x HAR-ri	*re-bi úḫ-ri*	fourth string of behind
7	nin-x-x	*šal-šu* sa? i?	third string of behind

The names of the strings on their own would not be enough to prove that the text was about music theory. The construction of the star gives a clue. The chords of the arcs in the heptagram and the numbering of its points, from one to seven, show a typical heptatonic construction made up from the alternation of fifths and fourths. We still do this today.

Another evidence proving that the text is about music theory is that it gives indications as to the relative pitch of its degrees.



This is precisely what column two confirms. It starts by 2-6, and continues with 6-3, reading the numbers horizontally or vertically. Therefore, 2 is B, if the system is descending, or F if it is ascending. The reason for this is that in both cases the tritone appears in the last two figures: 5-2, horizontally or vertically, restricting the scale to the seven degrees of heptatonism. It is this construction which distinguishes hepta from enneatonism. The numbers in the other columns make no sense and are not essential to our paper. We shall ignore them at present until the decypherment of the headers helps understand.

Why a dial?

We have to prove that the diagram represents a dial. The evidence in favour relies on two points. Firstly, could they make it, and secondly how and why would they use it.

Construction of the dial

The idea that it was a dial comes from the concentric circles. They suggest that one disk rotated onto the other. The evidence against is that there is no rivet seen to hold the disks together. A heptagram cannot be drawn with compass and ruler. The scribe drew the figure free hand. As a result, the drawing is uneven and there is no trace of a central point from which the circles were drawn. The disks could have been made of thin sheet metal, sufficiently robust, allowing for the inscription of names and numbers. But it could have been wood, velum, or whatever suitable material. Tin would be a good choice because it is reasonably maleable, sufficiently robust and easily engraved. Therefore, there is no technical hindrance for the making of the instrument.

Purpose of the dial

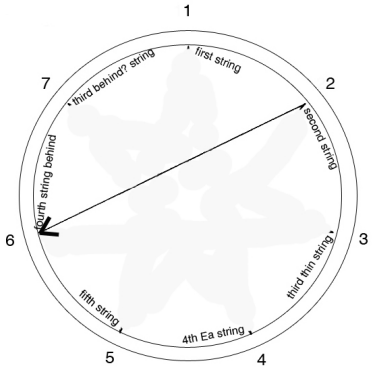
Without purpose, there is no reason. Therefore we have to determine the function of the instrument and that its function was a technical development hitherto unknown. The chords of the heptagram and its points define the order of the sequence of fifths and fourths necessary for the construction of the heptatonic scale.

The chords represent intervals of fifths or fourths, the points are the degrees containing the intervals.

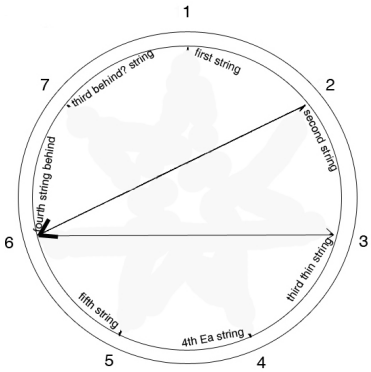
The seven phases of the construction are illustrated above. Note the last phase with the tritone located between 5 and 2 = F-B.

However, there is as yet no need for a dial to express the heptatonic construction.

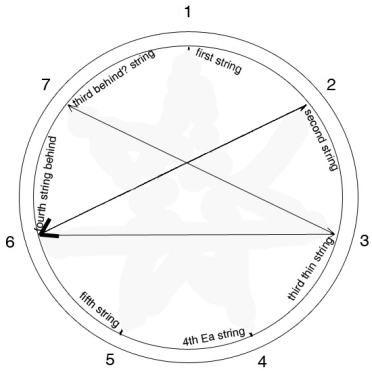
Descending fifth 2-6 (B-E)



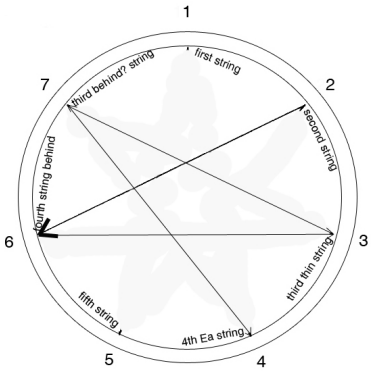
Ascending fourth 6-3 (E-A)



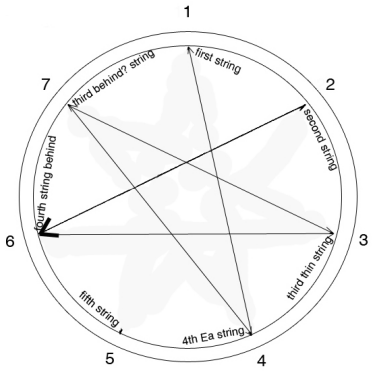
Descending fifth 3-7 (A-D)



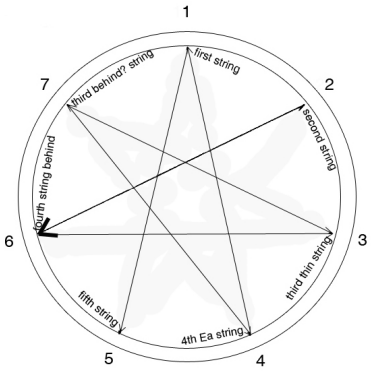
Ascending fourth 7-4 (D-G)



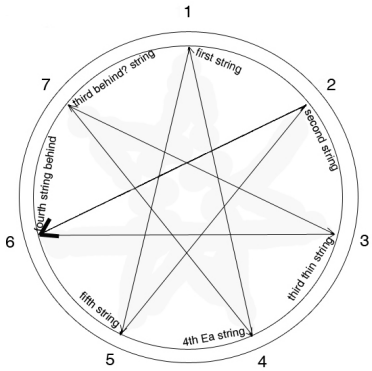
Descending fifth 4-1 (G-C)



Ascending fourth 1-5 (C-F)



Ascending fourth 5-2 (F-B)



Names and numbers

Evidence in favour of the diagram being a dial finds an answer with the association of names and numbers. As it stands the dial places number 1 at 12 o'clock. It is associated with the name of the first string. This means that they could be dissociated. Number one could be aligned with string two; three; four; five; six or seven. One disk must

have rotated on the other. If it did not, then they would have needed seven disks for their demonstration.

Having assumed that numbers could match different names, we have to explain why. As represented, the disks are aligned, number 1 with the name of the first string. Therefore number 2 with the name of the second string, etc. We have shown earlier that string two, aligned with number 2 would be either B should the system be descending, or F should it be ascending. Let it be descending. Then we would have a heptatonic descending scale of C=1-B=2-A=3-G=4-F=5-E=6-D=7, where, as a consequence of heptatonism, a semitone is located between numbers 1-2, and 5-6. The small disk would rotate onto the large disk where semitones would always be located between 1-2 and 5-6. The names of the strings would rotate onto each of the seven numbers thus giving the seven modes of the heptatonic system, in the dynamic. This is a crucially important point as it opposes to the enneatonic construction in UET.VII,74, where the method is based on the correction of the tritone. This ends up with eight hybrid modes, in the thetic. Therefore it was designed for the application on an instrument. A dial could not have been designed for the enneatonic model, but it was for the heptatonic. It is also a crucially important postulation that the dial was not designed for application onto an instrument. It was designed for the teaching of theory, because, exception made of the tuning of the fundamental scale, modal construction, as it is rendered, remains the prerogative of theory, not of practice. As a consequence, it is reasonable to assume that music theory was part of the syllabus.

Conclusion

I think we have satisfied our requisites. The figure must represent a dial. However, it might only have been the graphic representation of a concept which with time would have developed into the real thing. These dials can be bought today in music stores. However, their purpose has developed into harmony as they give the composition of various chords in all keys. The principle is the same as it relies on the location of semitones.

It is reasonable to assume that the Babylonians invented the device as a consequence of heptatonism.